must fully recognize their responsibilities to understand the risks of using chemical substances, make efforts to use alternatives or reduce consumption, prevent hazards and environmental impact, process or dispose of the chemical substances in appropriate ways (under users' responsibility to understand how the checmial substances they use are to be disposed of or processed), and properly manage them (throughout their handling of steps from the point of purchase through to use and disposal).

※ This handbook is posted on the Environment Preservation Center website.
(http://hozen2.epc.kanazawa-u.ac.jp/)

II Precautions for the Purchase, Storage, and Handling of Chemical Substances

To recognize that chemical substances are harmful and hazardous in nature and to handle them safely, users must sufficiently understand the characteristics, properties, and degree of risk of the chemical substances they use. All steps through acquisition (purchase), storage, use, and disposal are specified by applicable laws and regulations, and users are required to take responsibility for their management. Under such circumstances, a plan must be formed at the experimental planning stage by taking acquisition, use, and disposal into consideration. In addition, the specific precautions as listed below shall be observed in addition to other related laws and regulations and general precautions.

1. Precautions for purchase and storage

1) Purchase and store chemicals in the minimum required quantities. Only store necessary chemicals.
2) Study the safety data sheets (SDSs) of the chemical substances to understand their details (such as applicable laws and regulations, methods of handling, and methods of disposal) before you purchase them.
3) Upon receiving chemicals, check the containers and packaging, confirm that they are free of damage or liquid leaks, and register them in the Chemical Substance Management System.
4) Classify storage sites according to properties of the chemicals (toxic and deleterious substances, acid or alkaline substances, solid or liquid, organic or inorganic substances, etc.) by following precautions on labels or SDSs, and sort them by properties in chemical cabinets to prevent mix-ups.
5) Fix chemical cabinets to the floor or wall, and take preventive measures against falling.
6) To prevent damage or falls due to collision of chemical bottles in the cabinet, place appropriate partitions and rails, and provide each shelf with anti-slip measures and falling prevention rails. In addition, use trays to collect drippings.
7) Store and handle specified chemicals according to the specified standards.
8) Do not store chemicals designated as hazardous substances in a large quantities unnecessarily. (Use specified hazardous substance cabinets instead.)
9) Use refrigerators to store chemicals that become unstable at room temperature. Note that solvent vapor may leak from them during storage and become a source of ignition if they are stored at room temperature.
10) If a label is about to come off, securely re-attach it.
11) Periodically conduct inventory checks of chemicals.

2. Precautions for use and disposal

1) Many chemicals are subject to restriction of laws and regulations when they are used or disposed of. Make sure to observe applicable laws and regulations by referring to the items below:
   - As for mercury, its compounds and products containing mercury, observe VII-7.
   - As for toxic and deleterious substances, observe the 'Handling Procedure for the Management of Toxic and Deleterious Substances at Kanazawa University.'
   - As for chemical substances specified by the Ordinance on the Prevention of Organic Solvent Poisoning and the Ordinance on the Prevention of Hazards Due to Specified Chemical Substances (other hazardous substances), handle them in draft chambers.
2) All chemical substances pose some kind of hazard. Learn about the characteristics and properties (including methods of disposal) of chemicals to be used in advance by referring to SDSs in order to prevent accidents. Sufficiently understand the hazards, risks, and precautions for handling, storage, and disposal before using chemicals, and handle them carefully and safely.
3) Improper handling of chemical substances will cause health hazards or environmental disruption, resulting in problems not only for users but other people as well. Please keep in mind that the use of chemical substances always accompanies social liability.
4) Strictly observe safety guidelines and accident prevention manuals specified by your section or department.
5) Do not allow any student to conduct experiments by him/herself. This must be strictly observed during night-time or holidays in particular.
6) Most chemicals used in laboratories are hazardous. In conducting experiments or hands-on training, students shall follow the instructions of their teachers or instructors and shall not attempt to conduct any experiments beyond their abilities or without instructions.
7) Plan the scale of study appropriate for the purpose. Do not use more chemicals than necessary. Always keep workspaces tidy and neat in laboratories. In particular, be sure to place only necessary items on lab benches.
8) Make a mental note of where fire extinguishers and other fire prevention equipment are located, and become proficient in how to use them.
9) When completing experiments, never leave used chemicals on lab benches, and make sure to return them to the original storage sites. Do not place unnecessary chemicals at or near experiment sites.
10) Be sure to clean up the lab after conducting experiments (turn off the gas, water, and power supplies), and lock up the area. Pay attention to water pressure rises during the night, and water pressure fluctuations and water leakage when conducting experiments.
11) Post the management organization chart, actions to be taken in case of a disaster/accident, emergency contact information, and other necessary information at appropriate locations in the laboratories.
12) In the case of an accident, the person who caused it may be upset and cannot implement necessary measures appropriately; so those nearby shall take action. Be sure to notify faculty members and university staff.
13) Please keep in mind that any chemical substance, if improperly handled, has a risk to lead to an accident.

    Specific examples are provided below:
    - A substitute chemical was used, or the wrong chemical was erroneously used, resulting in poisoning and/or explosion.
    - The scale of the experiment (such as concentration or consumption) was enhanced from the existing level, resulting in poisoning and/or explosion.
    - The reaction conditions (such as drip speed, temperature, or agitation speed) were changed, resulting in poisoning and/or explosion.
    - Lab coats stained with hazardous substances were dry-cleaned, resulting in poisoning.

- Substitute or different pressure regulators for gas cylinders other than those specified were used, resulting in an explosion.
- Paper stained with a small quantity of a water prohibitive substance was discarded in a trash can, resulting in a fire (since it reacted with water in the atmosphere).

3. Major laws and regulations related to the handling of chemical substances

Poisonous and Deleterious Substances Control Act
Basic Environment Act
Water Pollution Prevention Act
Sewerage Act
Air Pollution Control Act
Offensive Odor Control Act
Fire Service Act
High Pressure Gas Safety Act
Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Act)
Industrial Safety and Health Act
  Ordinance on the Prevention of Organic Solvent Poisoning
  Ordinance on the Prevention of Hazards Due to Specified Chemical Substances
  Ordinance on the Prevention of Lead Poisoning
  Ordinance on the Prevention of Tetraalkyl Lead Poisoning
  Ordinance on the Prevention of Hazards Due to Dust
Waste Management and Public Cleansing Act
Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.
Pharmaceutical Affairs Act (Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices)
Agricultural Chemicals Control Act
Food Sanitation Act
Narcotics and Psychotropics Control Act
Stimulants Control Act
Act on Promotion of Global Warming Countermeasures
Act on Rational Use and Appropriate Management of Fluorocarbons
Act on prevention of Environmental Pollution by Mercury